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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/614,327	07/08/2003	Bruno Ghyselen	4717-7600	7326
28765	7590	05/18/2005	EXAMINER	
WINSTON & STRAWN LLP 1700 K STREET, N.W. WASHINGTON, DC 20006			WILCZEWSKI, MARY A	
			ART UNIT	PAPER NUMBER
			2822	

DATE MAILED: 05/18/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

10/614,327

Applicant(s)

GHYSELEN ET AL.

Examiner

M. Wilczewski

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 28 February 2005.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-25 and 34-39 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-25 and 34-39 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 08 July 2003 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All b) ☐ Some * c) ☐ None of:
- 1) ☒ Certified copies of the priority documents have been received.
 - 2) ☐ Certified copies of the priority documents have been received in Application No. _____.
 - 3) ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- * See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|---|---|
| 1) <input type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152) |
| 3) <input checked="" type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)
Paper No(s)/Mail Date <u>03/03/05</u> | 6) <input type="checkbox"/> Other: _____ |

DETAILED ACTION

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

Claims 1-13, 15-24 and 34-39 are rejected under 35 U.S.C. 103 as being unpatentable over Cheng et al., U.S. Patent 6,573,126, in view of Canaperi et al., U.S. Patent 6,524,935, both of record.

Cheng et al. disclose a method of preparing a semiconductor wafer which includes the steps of growing a first layer 808 of a first material (strained SiGe) on a matching silicon substrate 802 comprising a matching layer which includes graded SiGe layer 804 and relaxed SiGe layer 806, growing a second layer 810 of a second semiconductor material, different from the first material, wherein the first and second layers each have substantially the same first lattice parameter, creating a region of weakness 812 to facilitate splitting, and removing the first layer from the second layer to produce a boundary on the second layer 810 that is substantially smooth and of substantially uniform thickness, see figure 8 and column 6, line 33, bridging column 7 to line 10. Note that Cheng et al. teach that layer 810 may be a material other than SiGe, for example, pure Ge or some III-V materials, col. 7, ll. 2-6.

Cheng et al. create the region of weakness in the first layer. Cheng et al. lack anticipation only of creating the region of weakness in the matching substrate. Canaperi et al. also disclose a method of preparing a semiconductor wafer by transferring thin layers from a first handling substrate to a second unfinished substrate by creating a region of weakness in the relaxed SiGe layer formed on substrate 10, see the abstract; figures 2-4; column 2, lines 25-50; and column 4, lines 9-55. It would have been obvious to one skilled in the art that the region of weakness created in the known method of Cheng et al. could have been formed in relaxed SiGe layer 806, since Canaperi et al. teaches that forming the region of weakness in the relaxed SiGe layer smoothes the surface of the relaxed SiGe epitaxial layer and ensures that the second substrate has a planarized major surface making it suitable for subsequent epitaxial growth.

Claims 14 and 25 are rejected under 35 U.S.C. 103(a) as being unpatentable over Cheng et al., U.S. Patent 6,573,126, in view of Canaperi et al., U.S. Patent 6,524,935 as applied to claim 1 above, and further in view of Bae et al., U.S. Patent 6,633,066, all of record.

Cheng et al. and Canaperi et al. are applied as above. Both Cheng et al. and Canaperi et al. teach to separate the first and second substrates by creating a region of weakness in the first substrate by implanting hydrogen. However, it is well known in the art that two substrates can also be separated by the use of a porous layer. Bae et al. teach that both the implantation technique used in the prior art methods of Cheng et al. and Canaperi et al. and the technique of using a

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porous layer are art-recognized equivalent methods used for separating two substrates bonded together, see figures 3A-3E and 4A-4E of the Bae et al. patent. In light of the teaching of Bae et al., it would have been obvious to one skilled in the art that the separation technique of using a porous layer could have been substituted for the hydrogen implantation technique of Cheng et al. and Canaperi et al., since these techniques are art-recognized equivalents and produce the same result, namely, the separation of two bonded substrates.

Concerning claim 25, whereas Cheng et al. disclose an embodiment in which the matching layer and the second layer 810 comprise SiGe, claim 1 requires the first layer 808 and the second layer 810 to comprise different materials. Bae et al. has been cited as a teaching that it would have been obvious to use a strained Si layer in place of the strained SiGe first layer 808 used in the known method of Cheng et al., see figures 3A-3E and 4A-4E of the Bae et al. patent. The choice of material from which the first layer is made is purely a design choice dependent on what type of device is to be fabricated and what operating characteristics are desired. Hence, it would have been obvious to one skilled in the art that a strained silicon layer could have been substituted for the strained SiGe layer used in the known method of Cheng et al., if a transistor having a silicon channel is desired.

Response to Arguments

Applicant's arguments filed February 28, 2005, have been fully considered but they are not persuasive. Applicants have argued that the method of Cheng

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et al. does not produce a surface on the second layer, which is substantially smooth, and of uniform thickness due to damage thereon and the remaining surface of the second layer would not likely be useable in semiconductor manufacture. First, Applicants' arguments in support of this position are not commensurate in scope with the present claims. The claims, as presently written, do not require a semiconductor device to be manufactured on the surface produced by removing the first layer from the second layer. Moreover, the claims do not preclude an etching step from being performed after the removing step. Second, Cheng clearly teaches that the separation step forms a relaxed SGOI substrate. Hence, the resultant substrate of Cheng et al. is clearly of a quality suitable for semiconductor device manufacture. Moreover, Cheng discloses that the as-transferred SGOI substrate has a surface roughness which only requires removal of about 100 nm of the surface by CMP, see column 4, lines 44+. Third, claims 1 and 34 do not recite any specific thickness for either the first or second layer or do the claims require the splitting step to be accomplished by any specific technique. In addition, the claims do not require the region of weakness to be contained in a specific area of the matching substrate. The claims only require the formation of a region of weakness to be created in the matching substrate. The present claim language does not preclude the spreading of the region of weakness to adjacent layers. Canaperi has been relied upon as a showing that it would have been obvious to create the region of weakness in the matching substrate instead of the strained SiGe layer 808 of Cheng et al. Canaperi need not disclose the use of a strained layer to be properly combined

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with Cheng et al. For these reasons, the claimed method is still deemed unpatentable over the method of Cheng et al. in view of Canaperi.

Drawings

The drawings filed on 08 July 2003 are acceptable.

Conclusion

THIS ACTION IS MADE FINAL. Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire **THREE MONTHS** from the mailing date of this action. In the event a first reply is filed within **TWO MONTHS** of the mailing date of this final action and the advisory action is not mailed until after the end of the **THREE-MONTH** shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than **SIX MONTHS** from the mailing date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Mary Wilczewski whose telephone number is (571) 272-1849. The examiner can normally be reached on Monday and Thursday.

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The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).



M. Wilczewski
Primary Examiner
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